Astrophysics Branch (SSA) Overview

T. Greene presenting

Astrophysics Branch Mission

- Laboratory Research in Astrochemistry and Cosmochemistry
  - Photo-chemical synthesis of organic material in simulated ISM and solar system conditions
  - UV/Vis and IR spectral analysis and application to astronomical spectra
- Observational Astronomical Research in Astrobiology and Origins
  - Organic material in the Solar System and Interstellar medium
  - Astrophysics of Stars, Protostars, Stellar Winds, and Circumstellar Disks
  - Expertise in IR observations and instruments
- Development and Support of NASA Missions
  - “Home” of Kuiper Airborne Observatory, SOFIA, and SIRTF
  - Development and contributions to current and new Missions
  - SOFIA and space flight instrumentation development

SSA Personnel

CIVIL SERVANT SCIENTISTS

Lou Allamandola*
Jesse Bregman*
Tim Castellano
Sean Colgan*
Dale Cruikshank*
Edwin Erickson*
David Goorvitch* (60%)
Michael Haas*
Doug Hudgins*
David Koch*
Thomas Roellig*
Farid Salama*
Scott Sandford*

CONTRACTORS

James Baltz
Robert Cooper
Anna Glukhaya
Alan Meyer
Robert Rubin*
Fred Witteborn*

CIVIL SERVANT ADMIN & MGMT

Tom Greene*	Branch Chief
Dave Goorvitch* (40%)	Assistant Chief
Betty Baldwin	Comp. Spec.
Lupe Sanchez	Secretary

NRC POSTDOCTORAL FELLOWS

Bishun Khare*

STUDENT ASSISTANTS

Marie Hughes	Foothill
Franklin Nguyen	Foothill
Michael Rennick	Foothill
Brian Shiroyama	Foothill

CIVIL SERVANT TECHNICIANS

David Lesberg
Emmitt Quigley
David Scimeca
Robert Walker

COOPERATIVES

Dana Backman*
Max Bernstein*
Bin Chen*
Christina Dalle Ore*
Jesse Dotson*
Jason Dworkin*
Thomas Halasinski*
Marita Sablan
Janet Simpson*
Brad Stone*
Pasquale Temi*

* = PhD Scientist

1999 SSA Peer Reviewed Research (#1)

Title	P.I.	
Evolution of Biogenic Elements	Allamandola	Astrochemistry $579K total
Lab Study of Interstellar PAHs (IR)	Allamandola	
Astrobiology – Building Blocks of Life	Allamandola	
Interstellar Dust, Ice, & PAHS (LTSA)	Allamandola	
Formation of Amino Acids in Ices	Bernstein	
UV/Vis Lab study of PAHs	Salama	
Chemistry, Physics, Isotopes of Ices	Sandford	
ISOCAM Search for Hidden Supernovae	Bregman	Observations $290K total
Photochemistry of Pluto's Atmosphere	Cruikshank	
Volatiles in the Outer Solar System	Cruikshank	
Hubble Space Telescope NICMOS GTO	Erickson	
HST Planetary Nebulae	Rubin	

1999 SSA Peer Reviewed Research (#2)

Title	P.I.
IOTA Development	Bregman
SOFIA Science Work packages	Colgan et al.
Airborne Infrared Echelle Spectrograph	Erickson
Next Generation Detector Electronics	Erickson
NGST Conceptual Instrument Design	Greene
IR Detectors for Explorers & SOFIA	Greene
A Testbed for Planet Detection	Koch
GENESIS Filter Testing	Sandford
Electronic Spectroscopy of PAHs	Allamandola
IR Camera for Hidden Supernovae	Bregman
Extrasolar Planetary Searches	Castellano
High Res IR Spectroscopy of Young Stars	Greene
Spectra of Mass-Selected PAH Ions	Hudgins

Instruments
$2158K total

ARC DDFs
$231K total

1999 Research Funding Summary

Area	FY99 $K
Laboratory Astrochemistry	690
Astronomical Observations	369
Astronomical Instrumentation	2198
Mission Support	512
TOTAL	3769

DDF Projects have been distributed into research categories above

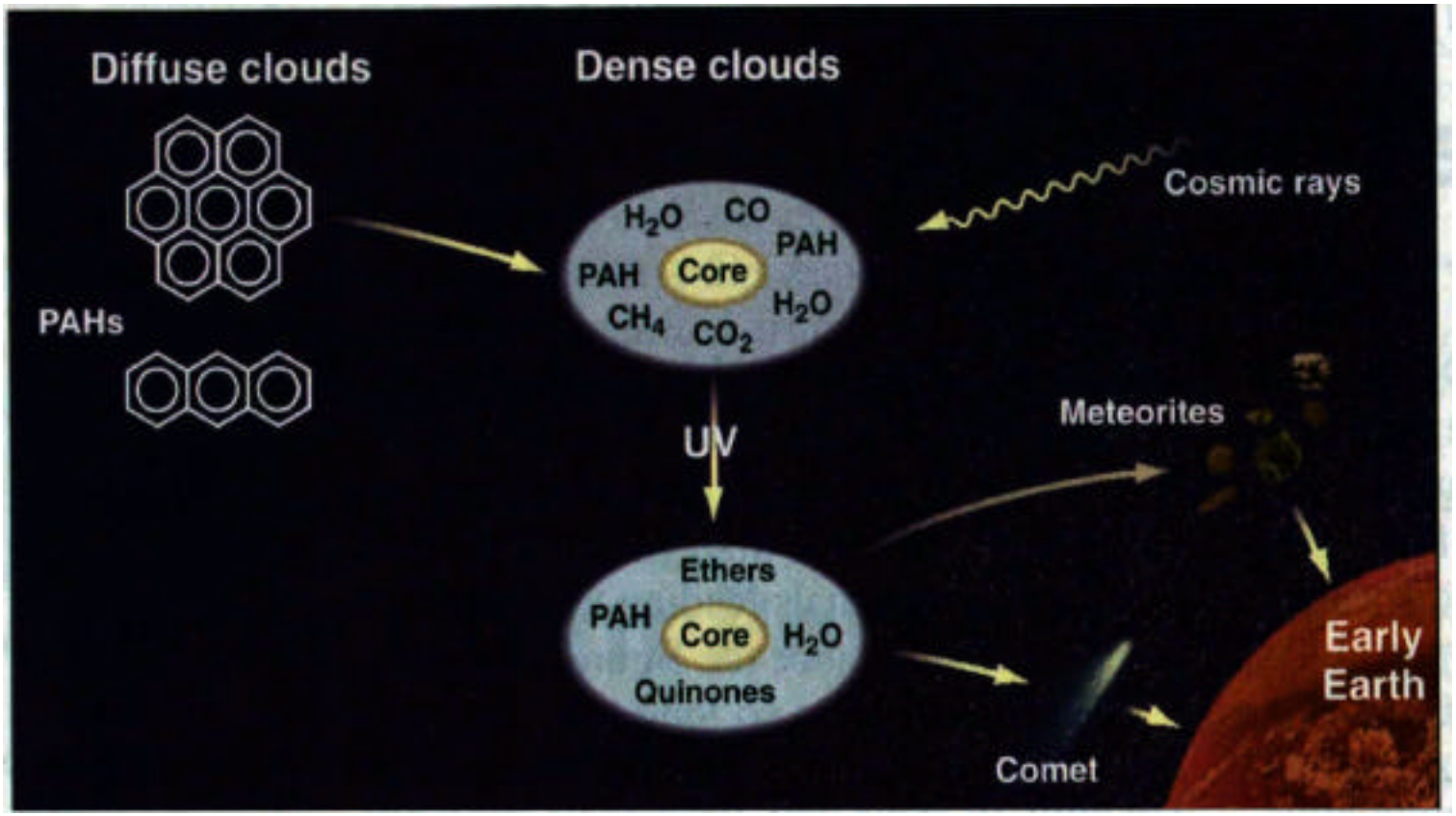
Recent Research Highlights

- Creation of organic matter in laboratory photolysis of interstellar ices
- Large database of PAHs / ions laboratory IR spectra

- Detection & identification of new organic matter in the outer solar system
- HST & ground-based IR studies of young stars and winds

- Progress on SIRTF, SOFIA, Kepler, FAME instruments & missions
- Completion of NGST instrumentation conceptual design study

Unique SSA/T Research Example



- SSA/T can uniquely investigate the creation and distribution of biogenic organic matter via lab astrochemistry, astronomical observations, and instrument development

Current NASA Mission Participation

Mission	Contribution
Cassini	Co-I (VIMS)
Full-Sky Astrometric Mapping Explorer (study)	Co-I
Kepler (study)	Co-I
Next Generation Space Telescope	ASWG
Stratospheric Observatory For Infrared Astronomy	Project Scientist
Stratospheric Observatory For Infrared Astronomy	Deputy Proj. Scientist
Stratospheric Observatory For Infrared Astronomy	Instrument PI
Stratospheric Observatory For Infrared Astronomy	Science Work Packages
Space Infrared Telescope Facility	Facility Scientist
Space Infrared Telescope Facility	IRS Instrument Deputy PI
Space Infrared Telescope Facility	Interdisciplinary Scientist
STARDUST	Co-I
Submillimeter Wave Astronomical Satellite	Co-I

1999 Community Service

NASA Review Panels

Explorers
Technology Studies
Origins
SBIR

Committees

SOFIA Science Steering Cttee
NAS Decadal Review UVOIR
NASA SSAC Origins subcttee

Conference Organization

2 day Astrochemistry APS session
CSFS Star Formation / SOFIA
SIRTF Solar System / C.S. Disks
Nstars

Education & Outreach

Teachers - STELLAR, Proj Astro, Origins of Life, Workshops, etc.
Students - SHARP / GSRP / STEP, PhD cttees, teaching
Encyclopedia & book chapters
Public Talks

Journals & Societies

IAU Commission Vice Pres
Meteoritics Assoc. Editor
ICARUS Assoc. Editor

Future Directions – Ambitions

- Grow Astrochemistry / Astrobiology
  - Grow laboratory astrobiology (space, staff)
  - Build observational astrochemistry / astrobiology / ISM astrophysics
  - Propose, win, build and use the SOFIA astrochemistry spectrograph (support, space, staff)
  - Participate in Astrobiology mission studies

- Grow Origins: strengthen Theory – Observation – Instrumentation trinity
  - Lead a SIRTF Legacy effort (staff)
  - More synergistic collaborations with SST
  - Propose and win the mid-IR NGST flight instrument (ARC support)

- More synergistic collaboration with SF(T)
  - Detector development
  - Unique instrument technologies